BASIS FOR THE AMENDMENT

Claims 28 and 33 have been amended as supported by Claims 28 and 33 as originally filed.

No new matter is believed to have been added by entry of this amendment. Entry and favorable reconsideration are respectfully requested.

Upon entry of this amendment Claims 1-26 and 28 and 32-33 will now be active in this application. Claims 24-26 stand withdrawn from further consideration.

REMARKS

The present invention as set forth in **Claim 1** relates to a photoreceptor, comprising:

an electroconductive substrate;

a charge generation layer located overlying the electroconductive substrate <u>with an intermediate layer</u> therebetween; and

a charge transport layer formed overlying the charge generation layer using a non-halogenated solvent and comprising a charge transport material and a resin;

wherein the charge generation layer comprises

a polyvinyl acetal resin, and

a charge generation material having an average particle diameter less than a roughness of a surface of the intermediate layer, on which the charge generation layer is located;

wherein the average particle diameter of the charge generation material is not greater than 0.3 μm and not greater than 2/3 of the roughness of the surface of the intermediate layer;

wherein the charge generation material is a titanyl phthalocyanine;

wherein the titanyl phthalocyanine has an X-ray diffraction spectrum according to Figure 13 when a Cu-Kα X-ray having a wavelength of 1.542 Å is used.

Amended Claim 28 relates to a photoreceptor, comprising:

an electroconductive substrate;

a charge generation layer located overlying the electroconductive substrate <u>with an intermediate layer</u> therebetween; and

a charge transport layer formed overlying the charge generation layer using a non-halogenated solvent and comprising a charge transport material and a resin;

wherein the charge generation layer comprises

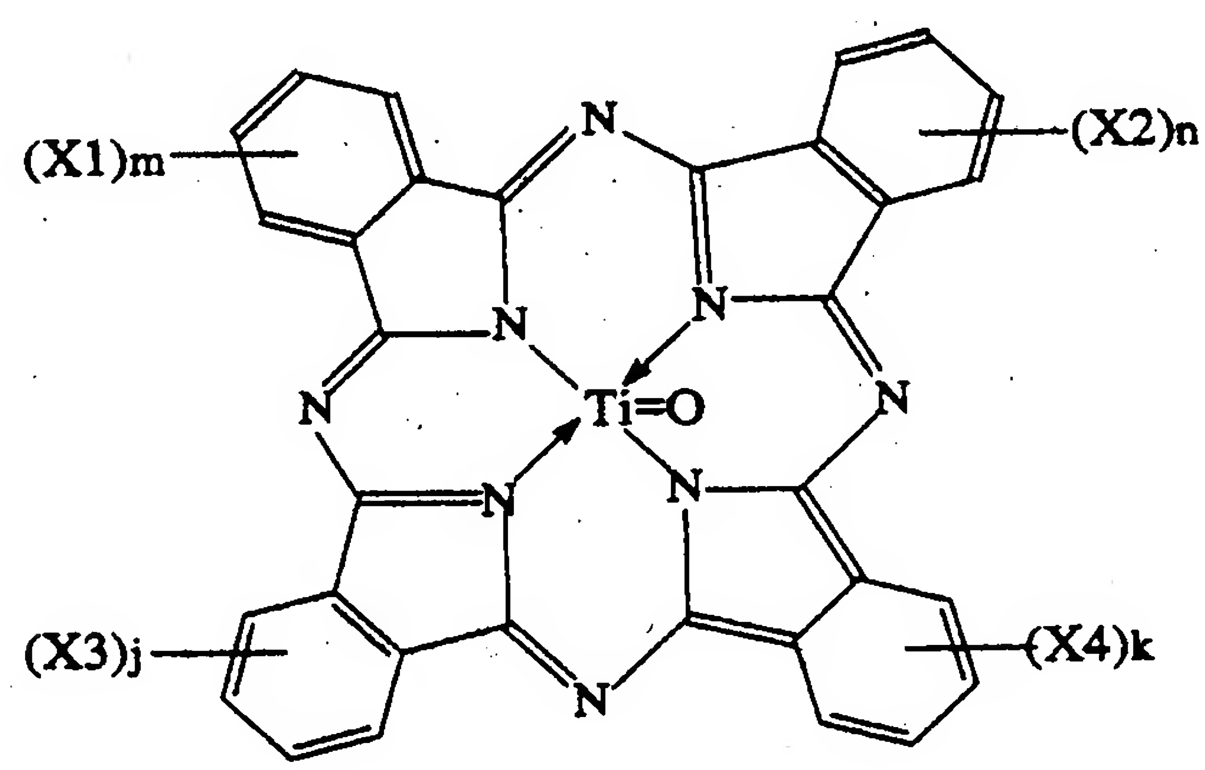
a polyvinyl acetal resin, and

a titanyl phthalocyanine, as charge generation material, having an average particle diameter less than a roughness of a surface of the intermediate layer, on which the charge generation layer is located,

wherein the titanyl phthalocyanine has an X-ray diffraction spectrum according to Figure 13 when a Cu-Kα X-ray having a wavelength of 1.542 Å is used;

wherein the average particle diameter of the charge generation material is not greater than 0.3 μm and not greater than 2/3 of the roughness of the surface of the intermediate layer; and

wherein said titanyl phthalocyanine is represented by formula (1)



(1)

wherein X1, X2, X3 and X4 independently represent a halogen atom, and m, n, j and k are 0.

Claim 32 relates to a photoreceptor, comprising:

an electroconductive substrate;

a charge generation layer located overlying the electroconductive substrate having <u>no intermediate layer</u> therebetween; and

a charge transport layer formed overlying the charge generation layer using a non-halogenated solvent and comprising a charge transport material and a resin;

wherein the charge generation layer comprises

a polyvinyl acetal resin, and

a charge generation material having an average particle diameter less than a roughness of a surface of the electroconductive substrate, on which the charge generation layer is located;

wherein the average particle diameter of the charge generation material is not greater than 0.3 μm and not greater than 2/3 of the roughness of the surface of the electroconductive substrate;

wherein the charge generation material is a titanyl phthalocyanine;

wherein the titanyl phthalocyanine has an X-ray diffraction spectrum according to Figure 13 when a Cu-Kα X-ray having a wavelength of 1.542 Å is used.

Amended Claim 33 relates to a photoreceptor, comprising:

an electroconductive substrate;

a charge generation layer located overlying the electroconductive substrate having <u>no intermediate layer</u> therebetween; and

a charge transport layer formed overlying the charge generation layer using a non-halogenated solvent and comprising a charge transport material and a resin;

wherein the charge generation layer comprises

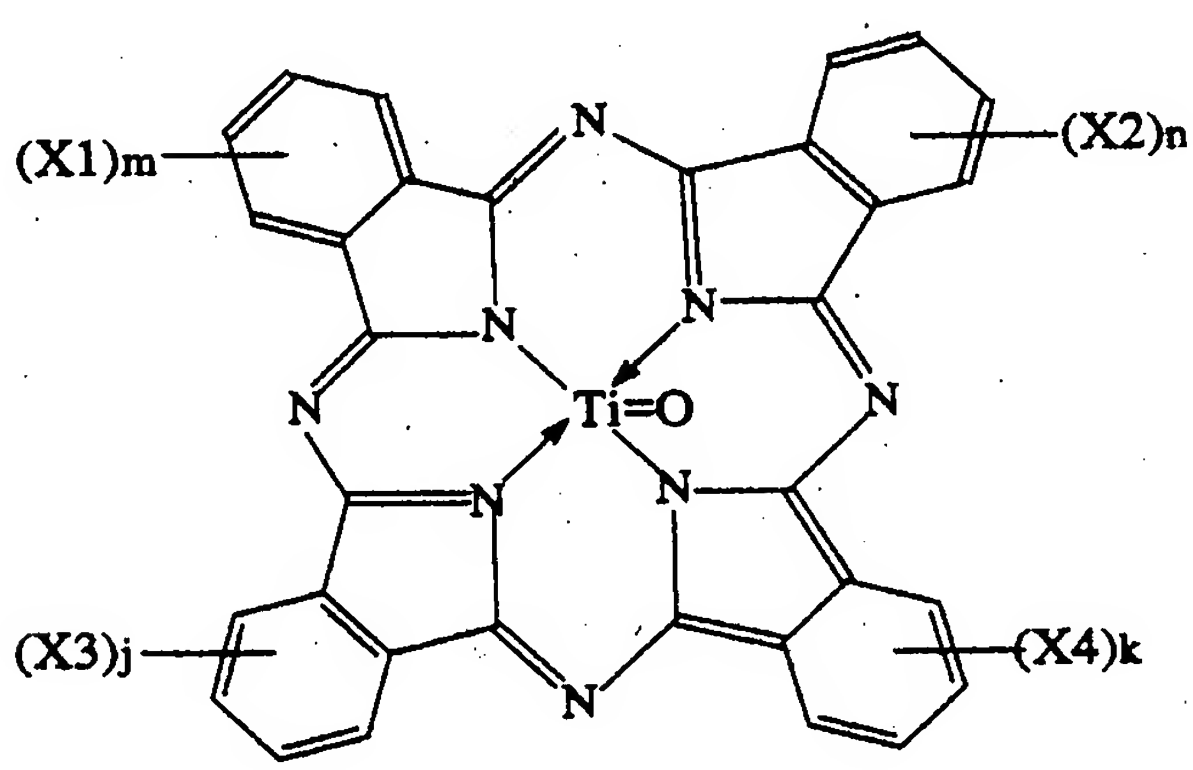
a polyvinyl acetal resin, and

a titanyl phthalocyanine, as charge generation material, having an average particle diameter less than a roughness of a surface of the electroconductive substrate, on which the charge generation layer is located,

wherein the titanyl phthalocyanine has an X-ray diffraction spectrum according to Figure 13 when a Cu-Kα X-ray having a wavelength of 1.542 Å is used;

wherein the average particle diameter of the charge generation material is not greater than 0.3 μm and not greater than 2/3 of the roughness of the surface of the electroconductive substrate; and

wherein said titanyl phthalocyanine is represented by formula (1)



(1)

wherein X1, X2, X3 and X4 independently represent a halogen atom, and m, n, j and k are 0.

The objection to Claims 28 and 33 and the rejection of Claims 28 and 33 under 35 USC § 112, 1st paragraph, are obviated in view of the amendment of the claims.

The rejections of the Claims over Niimi ('633), ACS File Registry, Chambers, Hashimoto, Takaya, Takaki, Yanus, Niimi ('654), Ishii, JP '358, Ladd et al, Tamura and Tamoto are traversed.

Niimi ('633), ACS File Registry, Chambers, Hashimoto, Takaya, Takaki, Yanus, Niimi ('654), Ishii, JP '358, Ladd et al, Tamura and Tamoto fail to disclose or suggest the

claimed photoreceptors (Claims 1, 28, 32 and 33) and the superior properties of the claimed photoreceptors as set forth in the specification.

Most notably, with regard to Claims 1 and 28, Niimi ('633), ACS File Registry, Chambers, Hashimoto, Takaya, Takaki, Yanus, Niimi ('654), Ishii, JP '358, Ladd et al, Tamura and Tamoto fail to disclose or suggest a photoreceptor, comprising: **a charge generation layer located overlying the electroconductive substrate with an intermediate layer therebetween; a charge generation material having an average particle diameter less than a roughness of a surface of the intermediate layer, on which the charge generation layer is located; wherein the average particle diameter of the charge generation material is not greater than 0.3 μm and not greater than 2/3 of the roughness of the surface of either the electroconductive substrate or the intermediate layer;** wherein the charge generation material is a titanyl phthalocyanine; wherein the titanyl phthalocyanine has an X-ray diffraction spectrum according to Figure 13 when a Cu-Kα X-ray having a wavelength of 1.542 Å is used.

Regarding Claim 32 and 33 Niimi ('633), ACS File Registry, Chambers, Hashimoto, Takaya, Takaki, Yanus, Niimi ('654), Ishii, JP '358, Ladd et al, Tamura and Tamoto fail to disclose or suggest a photoreceptor, comprising: **a charge generation layer located overlying the electroconductive substrate having no intermediate layer therebetween; and a charge generation material having an average particle diameter less than a roughness of a surface of the electroconductive substrate, on which the charge generation layer is located;** wherein the average particle diameter of the charge generation material is not greater than 0.3 μm and not greater than 2/3 of the roughness of the surface of the electroconductive substrate; wherein the charge generation material is a titanyl

phthalocyanine; wherein the titanyl phthalocyanine has an X-ray diffraction spectrum according to Figure 13 when a Cu-Kα X-ray having a wavelength of 1.542 Å is used.

Further, in order to protect environment, it is desired not to use a halogenated solvent when a photoreceptor is produced, particularly when a charge transport layer is prepared (because a large amount of solvent is used for preparing a charge transport layer). The object of the present invention is to prepare a charge transport layer without using a halogenated solvent. If a halogenated solvent is merely replaced with a non-halogenated solvent, the resultant photoreceptor is inferior in characteristics (such as photosensitivity). The reason therefore is as follows.

When a charge transport layer coating liquid including a non-halogenated solvent is coated on a charge generation layer, the charge generation material therein aggregates due to the solvent and thereby the specific surface area of the charge generation material decreases. Therefore, the probability that the charge generation material contacts with the charge transport material decreases, resulting in deterioration of photo-carrier generation efficiency, i.e., deterioration of photosensitivity. Therefore, it is necessary to prevent occurrence of aggregation of the charge generation material to avoid the photosensitivity deterioration problem. This can be achieved by controlling the surface roughness of the intermediate layer and the particle size of the charge generation material, the charge generation material aggregation problem can be avoided.

In other words, only after the following four points are understood, the present invention can be made:

1) to use a non-halogenated solvent;

2) when a non-halogenated solvent is used for preparing a charge transport layer on a charge generation layer, the charge generation material aggregates;

3) when the charge generation material aggregates, the photosensitivity of the resultant photoreceptor deteriorates; and

4) by controlling the surface roughness and the particle size of charge generation material, the charge generation material aggregation problem can be avoided.

Since these points are not disclosed and suggested in Niimi ('633), ACS File Registry, Chambers, Hashimoto, Takaya, Takaki, Yanus, Niimi ('654), Ishii, JP '358, Ladd et al, Tamura and Tamoto the present invention is not obvious.

Specifically, there is no disclosure in these references that agglomeration of the charge generation layer can be avoided as disclosed at pages 17 and 18 of the specification.

There is also no disclosure of the superior results obtained in the Synthesis Example 1 which relates to the TiOPc shown in Figure 13 of the present invention and which is used in Examples 1, 3 and 5-7 (no intermediate layer) and Examples 2, 4 and 14-16 (with intermediate layer) of the present invention.

Table 2

	Solvent of CTL liquid	Ave. particle diameter (μm)	Surface rough-ness (μm)	Image qualities		VL (-V)	
				Back-ground fouling	Image density	At the start of test	At the end of test
Ex. 1	THF	0.2	1.0	○	○	90	95
Ex. 2	THF	0.2	0.6	○	○	85	95
Ex. 3	THF	0.2	0.3	Δ	○	85	90
Ex. 4	THF	0.2	0.4	○	○	95	105
Ex. 5	THF	0.6	1.0	Δ	○	100	125
Ex. 6	Dioxolan	0.2	1.0	○	○	100	110
Ex. 7	THF/toluene	0.2	1.0	○	○	80	85
Comp. Ex. 1	THF	0.2	-	X	X	100	160
Comp. Ex. 2	THF	0.6	0.6	X	Δ	110	150
Comp. Ex. 3	THF	0.6	0.3	X	X	100	170
Comp. Ex. 4	THF	0.6	0.4	X	X	115	165
Comp. Ex. 5	THF	0.6	-	X	X	120	180
Comp. Ex. 6	Dioxolan	0.2	-	X	X	130	200
Comp. Ex. 7	THF/Toulene	0.2	-	X	X	100	160
Ref. Ex. 1	Dichloro-methane	0.2	1.0	Δ	○	85	90
Ref. Ex. 2	Chloroform	0.2	1.0	Δ	○	95	100
Ex. 8	THF	0.2	0.6	Δ	Δ	115	145
Ex. 9	THF	0.2	0.6	Δ	Δ	105	135
Ex. 10	THF	0.2	0.6	Δ	Δ	110	140
Ex. 11	THF	0.2	0.6	Δ	Δ	105	140
Ex. 12	THF	0.2	0.6	Δ	Δ	110	145
Ex. 13	THF	0.2	0.6	Δ	Δ	105	135
Ex. 14	THF	0.2	0.6	◎	◎	85	95
Ex. 15	THF	0.2	0.6	◎	○	80	90
Ex. 16	THF	0.2	1.0	Δ	○	100	120
Comp. Ex. 8	THF	0.2	1.0	X	Δ	100	145

As can be understood from Table 2, the photoreceptor of Examples 1-7 and 14-16 whose CGL is formed without using halogen-containing solvents, can maintain good photosensitivity even when used for a long period of time. Therefore, the photoreceptor can stably produce good images.

These superior results are not disclosed or suggested by Niimi ('633), ACS File Registry, Chambers, Hashimoto, Takaya, Takaki, Yanus, Niimi ('654), Ishii, JP '358, Ladd et al, Tamura and Tamoto.

Further, it is essentially true that the photoreceptors prepared by using a non-halogenated solvent have lower photosensitivity than the photoreceptors prepared by using a halogenated solvent.

One of the differences lies in FIGS. 2 and 3. Specifically, when a coating liquid including a halogenated solvent is coated, the charge generation layer (on which the coating liquid is coated) is hardly changed. However, when a coating liquid including a non-halogenated solvent is coated, the charge generation layer is clearly agglomerated. Since the mechanism of the agglomeration is unknown, the mechanism is not described in the present specification. Applicants consider that whether or not agglomeration of the charge generation layer is caused may depend on the molecular weight of the solvent used for the coating liquid.

The Examiner states that non-halogenated solvents do not produce unexpected results. Applicants disagree. It is clear from comparison between FIGS. 2 and 3 and FIGS. 4 and 5 that agglomeration of the charge generation material in the charge generation layer is influenced by the roughness of the surface (of a substrate) on which the charge generation layer is formed. This is never described in any of the cited references. Namely, the present inventors discovered the problem, which is not described in the cited references and the solution of the problem.

Further, the Examiner has been referring to Example 28 of Niimi '633. It is true that Niimi '633 includes an example in which a charge transport layer is formed using a non-halogenated solvent (i.e., tetrahydrofuran). However, in all the photoreceptors (for example, Examples 1-17) in which the charge transport layer thereof is formed using tetrahydrofuran, the charge generation layer of each of the photoreceptors includes an azo pigment. In contrast, in the photoreceptor of Example 28 in which a titanyl phthalocyanine is used for the

charge generation layer thereof, a halogenated solvent, methylene chloride, is used for forming the charge transport layer. This is because tetrahydrofuran cannot be used for forming the charge transport layer unlike Examples 1-17. Since the charge generation layer has a specific roughness and the charge generation material therein has a specific particle diameter, the agglomeration problem of titanyl phthalocyanine is not caused.

Although Examples 1-17 using an azo pigment and Example 28 using a titanyl phthalocyanine are described in the same section (EXAMPLES) of Niimi '633, Examples 1-17 have little in common with Example 28 except that a specific polycarbonate resin is used for the protective layer thereof. Thus, the Examiner's judgment such that the non-halogenated solvent (tetrahydrofuran) used for Examples 1-17 can also be used for Example 28 is incorrect.

Therefore, the rejections of the Claims over Niimi ('633), ACS File Registry, Chambers, Hashimoto, Takaya, Takaki, Yanus, Niimi ('654), Ishii, JP '358, Ladd et al, Tamura and Tamoto are believed to be unsustainable as the present invention is neither anticipated nor obvious and withdrawal of these rejections is respectfully requested.

The Examiner is requested to withdraw the **provisional** double patenting rejections over Serial Nos. 10/804,067, and 10/656,280 if they are the only remaining rejections in the case. See MPEP 822.01.

This application presents allowable subject matter, and the Examiner is kindly requested to pass it to issue. Should the Examiner have any questions regarding the claims or otherwise wish to discuss this case, he is kindly invited to contact Applicants' below-signed representative, who would be happy to provide any assistance deemed necessary in speeding this application to allowance.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.

Kirsten Grueneberg

J. Derek Mason, Ph.D.
Registration No. 35,270

Kirsten A. Grueneberg, Ph.D.
Registration No.: 47,297

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
NFO:KAG: